



NASA STTR 2015 Phase I Solicitation

T12.03 Advanced Bladder Materials for Inflatable Habitats

Lead Center: JSC

This subtopic solicits advanced bladder materials for use in inflatable structures. Inflatable structures are a solution for increasing the volume and decreasing the weight and launch package for habitats, airlocks, and potentially other crewed vessels. Ideal bladder materials are low permeability gas barriers, durable over time, and do not degrade due to effects such as cold flow. Low permeability bladder materials that can withstand extreme cold temperatures (-90 °F), recover, and then deploy at low temperatures (-30 °F and -50 °F) while still maintaining low permeability rates (goal of 1.5 cc/100in²/day/atm), are of particular interest. Multi-functional materials (self-healing, flame resistant, puncture resistant...) are also of interest, however, cold flexure is of prime concern. The bladder materials should also be low mass (goal of <6 oz./yd²) and be able to be manufactured into complex shapes (such as dual curvature). Developments can include material development and testing, and/or demonstration of manufacturing techniques.

Phase I and/or Phase II deliverables should include material identification and/or development, and bladder materials flexure tested at various temperatures (such as room temperature, -30 °F, and -50 °F) and then permeability tested at room temperature. In addition, bladder materials can be lightly packed and folded and then taken to even colder temperatures (for example; -90 °F, -75 °F, and/or -60 °F) for an extended period of time (24 hours to a few months), allowed to recover, unfolded at cold temperatures (-30 °F and -50 °F) and then permeability tested at room temperature. Bladder materials should demonstrate the ability to be manufactured into complex shapes. The colder temperature the bladder materials can withstand (cold storage and deployment) and still meet the permeability goal, after recovery, the better the results.